

**2004 Focused Interest Group**  
**Materials Research in an Aberration Free Environment**  
**Pre-Congress Meeting, July 31 and August 1, 2004, Savannah, Georgia**

**Location:** Oglethorpe Auditorium, Savannah Convention Center

**Program**

July 31, 2004

8:15– 8:30 am “Welcome and Introduction”  
C. Kisielowski, NCEM, Lawrence Berkeley National Laboratory

**Improvements in STEM and TEM Instrumentation for Materials Science Applications**

**TBA (chair)**

8:30– 9:00 am  
“Design of an electron optical system for Cc correction”  
*M. Haider, CEOS, Germany*

9:00 – 9:30 am  
“First experimental proof of spatial resolution improvement in a monochromized and Cs-corrected TEM”  
*B. Freitag et al., FEI Electron Optics, The Netherlands*

9:30 – 10:00 am  
“Sub-Angstrom and sub-eV resolution with the analytical SATEM”  
*G. Benner et al., Zeiss, Germany*

10:00 – 10:30 \*\* Coffee Break \*\*

10:30 – 11:00 am  
“A new double-corrected HREM/STEM and its applications for advanced materials research”  
*J.L. Hutchison et al., University of Oxford, UK*

11:00 – 11:30 am  
“Measuring physical properties at the sub-nm scale in a STEM: the Orsay SuperSTEM project”  
*A. Gloter et al. Université Paris Sud, France*

11:30– 12:00 am  
“Materials applications of aberration-corrected STEM”  
*S. Pennycook, Oak Ridge National Laboratory, USA, and O. Krivanek, NION, USA*

12:00 – 1:30 pm \*\*Lunch Break\*\*

## Prospects for Dynamic Experiments

**B. Kabius (chair)**

1:30 – 2:00 pm

“Toward ultrafast electron microscopy”

*W. King, Lawrence Livermore National Laboratory, USA*

2:00 – 2:30 pm

“Magnetic imaging of information storage materials”

*A. Petford-Long, University of Oxford, UK*

2:30 – 3:00 pm

“HRTEM image simulation of carbon nanotubes in an actual growth environment”

*S. Takeda et al., University of Osaka, Japan*

3:00 – 3:30 pm \*\*Coffee Break\*\*

3:30 – 4:00 pm

“In-situ experiments in the high-voltage microscope in Stuttgart - Need for better resolution”

*M. Ruehle, MPI Stuttgart, Germany*

4:00 – 4:30 pm

“To correct or not to correct? Strategies if you do and strategies if you don’t”

*R. Dunin-Borkowski, University of Cambridge, UK*

4:30 – 5:00 pm

“Aberration-Corrected Electron Microscopy in Nanocatalysis”

*Pratibha L. Gai, DuPont and University of Delaware, Newark, USA*

5:30 – 7 :00 pm \*\* Posters & Refreshments\*\*

**Location: Hyatt Regency Harborside Center, River Street**

## **Program**

August 1, 2004

### **Aberration Correction beyond STEM and TEM Imaging**

**R. Phaneuf (chair)**

8:30– 9:00 am

“Correction of spherical aberration in a Focused Ion Beam system by means of space charge”

*J. Orloff, University of Maryland, USA*

9:00 – 9:30 am

“Outline of the mirror corrector for SMART and PEEM3”

*H. Rose, University of Darmstadt, Germany*

9:30 – 10:00 am

“Prospects For Aberration Corrected Nanocrystallography”

*L. D. Marks, C. S. Own and W. Sinkler, Northwestern University, USA*

10:00 – 10:30 \*\* Coffee Break \*\*

10:30 – 11:00 am

“Monochromated ELS: history, context and opportunities.”

*J.C.H. Spence et al., Arizona State University and Lawrence Berkeley National Laboratory, USA*

11:00– 11:30 am

“Developments in XEDS and SCEM as they relate to aberration corrected microscopes”

*N. Zaluzec, Argonne National Laboratory, USA*

11:30 –11:45

Aberration Minimized FESEM for Nanotechnology Applications

*E. D. Boyes, DuPont Company, USA*

11:45 – 1:00 pm \*\*Lunch Break\*\*

## **Addressing Limits: Single Atom Detection**

**C. Kisielowski (chair)**

1:00 – 1:30 pm

“Quantitative aberration-corrected transmission electron microscopy”

*K. Urban, Institut für Festkörperforschung and Ernst Ruska-Centrum, Jülich, Germany*

1:30 – 2:00 pm

“Electron holography with Cs-corrected TEM”

*H. Lichte et al., Institute of Structure Physics, Dresden University, Germany*

2:00 – 2:30 pm

" Direct and Indirect Aberration Correction and Compensation for sub Ångstrom imaging"

*A.I. Kirkland, University of Oxford, UK*

2:30 – 3:00 pm \*\* Coffee Break\*\*

3:00 – 3:30 pm

“Prospects for bright field and dark field electron tomography on a discrete grid”

*J. Jinschek et al., Lawrence Berkeley National Laboratory, USA*

3:30 – 4:00 pm

“Potential for Optical Sectioning in Aberration-Corrected Z-contrast STEM”

*P. M. Voyles, University of Wisconsin, USA*

4:00 – 4:30 pm

“Atomic resolution electron tomography: a dream?”

*D. Van Dyck, University of Antwerp, Belgium*

4:30 - 5:00 pm

Conference summary

## **Posters:**

P1:

### **Image-based nanocrystallography by means of transmission electron goniometry**

Peter Moeck \*, Bjoern Seipel \*, Wentao Qin \*\*, Philip B. Fraundorf \*\*\*

\* Department of Physics, Portland State University, P.O. Box 751, Portland, OR 97207-0751

\*\* Technology Solutions, Freescale SemiconductorTM, Inc., MD CH305, Chandler, AZ 85284

\*\*\* Physics and Astronomy and Center for Molecular Electronics, University of Missouri at St. Louis, MO 63121

P2:

### **A new Approach for Electron Tomography: ADF-TEM**

S. Bals, V. Radmilovic, Q. Yang and C. Kisielowski

Ernest Orlando Lawrence Berkeley National Laboratory, National Center for Electron Microscopy, Berkeley, CA 94720, USA

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### **EROSION OF TEM SPECIMENS IN AN INTENSE ELECTRON BEAM**

R.F. Egerton\* and P.A. Crozier\*\*

\* Physics Department, University of Alberta, Edmonton, Canada T6G 2J1.

\*\* Center for Solid State Science, Arizona State University, Tempe, AZ 85281, USA.

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### ***In Situ* PEEL Spectroscopic Determination and EFTEM Imaging of Multiple Materials Properties at the Nanoscale Using Universality and Scaling in Solid-State Property-Plasmon Energy Relationships: New Capabilities for Analytical Electron Microscopy**

Vladimir P. Oleshko and James M. Howe

University of Virginia, Department of Materials Science & Engineering, Charlottesville, VA 22904

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### **The Possibility of TEM-based X-ray Microanalysis with a Microcalorimeter Detector**

E.A. Kenik,\* I.M. Anderson,\* D.C. Joy\* & \*\* and H. Demers\*&\*\*\*

\*Metals and Ceramics Division, Oak Ridge National Laboratory, Oak Ridge TN 37831-6064

\*\*Electron Microscopy Facility, University of Tennessee, Knoxville TN 37996-0840

\*\*\*Dept of Mining, Metals and Mat. Eng., McGill University, Montréal, Québec, Canada H3A 2B2

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## **The Dynamics of Nano-oxidation Reactions Visualized by *in situ* UHV-TEM**

JUDITH C. YANG

Department of Materials Science and Engineering, 848 Benedum Hall, University of Pittsburgh, Pittsburgh, PA 15261.

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## **Outlook of application of aberration corrected-electron microscopy in the ligand-protected metal clusters**

HUIPING XU\*, RAY D. TWESTEN\*\*, LAURENT MENARD\*\*\*, ANATOLY FRENKEL\*\*\*\*, RALPH NUZZO\*\*\*, DUANE JOHNSON\*\*\*\*\* JUDITH C. YANG \*

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## **Retrieving Potential Maps from Reversed Multislice Calculations**

Fu-Rong Chen,\* Christian Kisielowski,\*\* Joerg R. Jinschek, \*\* Juergen Plitzko,\*\*\* and Ji-Jung Kai \*

\* Dept. of Engineering and System Science, National Tsing Hua University, Hsin- Chu, Taiwan

\*\* Ernest Orlando Lawrence Berkeley National Laboratory, National Center for Electron Microscopy, Berkeley, CA, U.S.A.

\*\*\* Max-Planck-Institut für Biochemie, Am Klopferspitz 18, D-82152 Martinsried, Germany

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## **Sub-Ångstrom Metrology of Resolution in Aberration-Corrected Transmission**

### **Electron Microscopes using the A-OK Standard Test Specimens**

Lawrence F. Allard\* and Michael A. O'Keefe\*\*

\*Metals and Ceramics Division, ORNL, Oak Ridge, TN 37831-6064, USA

\*\*Materials Sciences Division, LBNL 2-200, 1 Cyclotron Road, Berkeley, CA 94720, US

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## **Sub-Ångstrom Resolution with Aberration-Corrected TEM: Present and Future**

Michael A. O'Keefe

Materials Sciences Division, LBNL 2-200, 1 Cyclotron Road, Berkeley, CA 94720, USA

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